IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

APPLICANT:	Bruce M. Schena et al.
SERIAL NO.:	09/755,383
FILING DATE:	January 5, 2001
TITLE:	Force Feedback Interface Device with Touchpad Sensor
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ART UNIT:	2673

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APPEAL BRIEF

Dear Sir:

This paper is in support of a Notice to Appeal from the final Office Action dated May 5, 2004 to the Board of Patent Appeals and Interferences. Please consider the following.

05/10/2005 MAHMED1 00000063 09755383
02 FC:1254 1590.00 OP

REMARKS

Related Appeals and Interferences

NONE

Status of Claims

1 – 46 69 – 70 — CANCELLED

47 – 68 71 – 80 — PENDING and BEING APPEALED

Status of Amendments

ALL AMENDMENTS AFTER FINAL HAVE BEEN ENTERED

Summary of Invention

The invention is generally directed to a computer input device, such as a "mouse," which is equipped with a feedback mechanism designed to impart forces onto the input device as it is being manipulated by the user. The feedback provides the user with tactile, or "haptic," sensations as the user manipulates the input device in order to add a further dimension to the interaction with the computer.

The feedback provided to the input device by the computer is based on computer commands generated in response to the location, rate of movement and amount of force exerted by the user on the input device in the course of implementation of a particular computer application which can be graphically displayed on the computer screen. Such applications include movement of a cursor on the computer screen and other GUI (graphical user interface),

gaming and simulation programs.

The invention is implemented using a mechanical linkage 40 (FIG. 2) connected to the input device 12 (the input device corresponds to the "object" in the claims). This linkage includes a transducer system 41 (FIG. 2) having sensors 62 for determining the forces and movement exerted on the input device by the user and actuators 64 for imparting forces onto the input device responsive to commands from the computer. An electronic interface 100 (FIG. 6) is interposed between the transducer system 41 and the computer in order to transmit appropriate signals between these devices and thereby provide the haptic control of the input device.

The sensors include a touchpad sensor 161 (FIG. 4f) which detects planar x-y movement, along with exerted pressure—that is, force in the z direction—on the input device.

Issues

I. Whether the obviousness rejection of Claims 47-50, 52, 54, 56-60, 71-73, 75 and 77-80 under 35 U.S.C. § 103 (a) based on Hannaford et al. (5,642,469) in view of Noll (3,919,691) is proper.

II. Whether the obviousness rejection under 35 U.S.C. § 103 (a) of Claims 51, 53, 55, 61-68, 74 and 76 based on Hannaford et. al. (5,642,469) in view of Noll (3,919,691) and Zilles et al. (6,111,577) is proper.

Grouping of Claims

Claims 47 – 59, 77 and 78 stand together;

Claims 60 – 68, 79 and 80 stand together;

Claims 71 – 76 stand together.

Argument

I. Claims 47-50, 52, 54, 56-60, 71-73, 75 and 77-80 have been finally rejected under 35 U.S.C. § 103 (a) as allegedly being unpatentable over Hannaford et al. (5,642,469) in view of Noll (3,919,691).

Claim 47 recites, *inter alia*, a touchpad sensor for detecting position and motion in the x-y plane and force in the z-direction, at least one actuator coupled to and spaced from the touchpad sensor, and a linkage coupling an object and the touchpad sensor.

Hannaford et al. does not disclose a touchpad sensor. Rather, Hannaford et al. discloses a planar assembly 20 which supports an end effector 18 by way of chains 26, 28 and 30 such that the end effector can be moved in the x-y plane. The planar assembly itself is supported by links 68 and 70 to be movable in the z-direction. There is no suggestion in Hannaford et al. of the use of a touchpad sensor, or of a linkage coupling the touchpad sensor with an object in the manner of the present invention. Instead, in Hannaford et al., a much more complex and massive arrangement is used, none of the components of which can be equated with the touchpad sensor of the present invention, or with the linkage coupling the touchpad sensor with an object. This shortcoming is not remedied by Noll, even if the latter were properly combinable with Hannaford et al., a point which has not been adequately advanced in the rejection of the claims and which is not conceded by Applicants.

Claim 60 also recites a touchpad sensor and a linkage coupling it to an object, while

method Claim 71 recites detection of motion and position in the x-y plane and force in the z-direction using a touchpad sensor. As explained above, these features are neither disclosed nor suggested by Hannaford et al. and Noll, considered singularly or in combination. The obviousness rejection under 35 U.S.C. § 103(a) of Claims 60 and 71, along with that of Claim 47, based on Hannaford et al. and Noll is therefore improper and should be withdrawn.

II. Claims 51, 53, 55, 61-68, 74 and 76 have been finally rejected under 35 U.S.C. § 103 (a) as allegedly being unpatentable over Hannaford et. al. (5,642,469) in view of Noll (3,919,691) and Zilles et al. (6,111,577).

Zilles et al. fails to remedy the shortcomings of Hannaford et al. and Noll in teaching or rendering obvious the invention of Claims 47, 60 and 71. In particular, Zilles et al. fails to teach or suggest the use of a touchpad sensor or associated linkage. Claims 51, 53, 55, 61-70, 74, and 76 depend from Claims 47, 60, and 71 and are therefore also allowable over the combination of these three references. Accordingly, withdrawal of the obviousness rejection under 35 U.S.C. 103(a) of Claims 51, 53, 55, 61-70, 74, and 76 is also respectfully urged.

Respectfully submitted,
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Dated: May 5, 2005

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APPENDIX:

The claims involved in the appeal are:

47. A device, comprising:

a touchpad sensor configured to detect a position and motion of an object in an x-y plane, said touchpad sensor further configured to detect a degree of force applied to said touchpad sensor in a z-direction and to output at least one sensor signal, the sensor signal being based on the position of the object, the motion of the object and the detected degree of force;

at least one actuator coupled to and spaced apart from said touchpad sensor, said actuator configured to receive a feedback signal and generate haptic feedback based on the feedback signal, the feedback signal being associated with the sensor signal; and

a linkage coupling the object and the touchpad sensor.

48. The device of claim 47, wherein a magnitude of the haptic feedback is proportional to the detected degree of force.

49. The device of claim 47, wherein the haptic feedback is configured to simulate friction in the x-y plane.

50. The device of claim 47, wherein the haptic feedback is based on data values associated with a graphical representation of a pen drawing object on a graphical display.

51. The device of claim 47, wherein said sensor signal is further based on a velocity of the object in the x-y plane.

52. The device of claim 47, wherein the haptic feedback includes a texture sensation.

53. The device of claim 52, wherein the texture sensation is modulated as a function of the detected degree of force in the z-direction and the velocity in the x-y plane.

54. The device of claim 47, wherein the actuator is configured to generate the haptic feedback if the detected degree of force exceeds a predetermined level.

55. The device of claim 47, wherein the detected degree of force is operative to control an indexing function of said device.

56. The device of claim 47, wherein said touchpad sensor is configured to detect a contact location of a pointer member, the pointer member being associated with the object.

57. The device of claim 47, wherein the linkage is configured to allow motion of the object in the x-y plane.

58. The device of claim 47, wherein the object is a mouse.

59. The device of claim 47, wherein said touchpad sensor is a planar photodiode.

60. A device, comprising:

an object moveable in an x-y plane, the object being associated with a graphical representation of a cursor;

a touchpad sensor spaced apart from the object, the touchpad sensor configured to detect motion of said object in the x-y plane, the touchpad sensor further configured to detect a degree of force applied to said touchpad sensor in a z-direction; and

at least one actuator being configured to provide haptic feedback based on the detected degree of force applied to said touchpad sensor;

a linkage coupling the object and the touchpad sensor.

61. The device of claim 60, further comprising a control processor configured to send a control signal to said actuator to generate the haptic feedback, the control signal being based on at least he detected degree of force applied to said touchpad sensor.

62. The device of claim 60, wherein the haptic feedback is provided in the x-y plane of the object, the haptic feedback being configured to include a damping sensation, a magnitude of the damping sensation being based on at least the detected degree of force applied to the touchpad sensor.

63. The device of claim 62, wherein the damping sensation is proportional to the detected degree of force applied to the touchpad sensor.

64. The device of claim 60, wherein the haptic feedback includes a friction sensation, a magnitude of the friction sensation being based on at least the detected degree of force applied to said touchpad sensor.

65. The device of claim 64, wherein the friction sensation is proportional to the detected degree of force applied to said touchpad sensor.

66. The device of claim 60, wherein the haptic feedback is a texture sensation, a magnitude of the texture sensation being based on at least the detected degree of force applied to said touchpad sensor.

67. The device of claim 66, wherein the texture sensation is proportional to the detected degree of force applied to said touchpad sensor.

68. The device of claim 60, wherein said object is a mouse, and the detected degree of force applied to said touchpad sensor is proportional to an external force received at a top surface of the mouse.

71. A method, comprising:

detecting a position and a motion of an object in an x-y plane using a touchpad sensor, the object being coupled to the touchpad sensor via a linkage;

detecting with the touchpad sensor a degree of force applied to the touchpad sensor in a z-direction;

receiving a feedback signal from a computer, the feedback signal being based on data values associated with a position of a graphical representation of a cursor controllable by the object; and

outputting haptic feedback to the object via an actuator, the actuator being coupled to and spaced apart from the touchpad sensor, the haptic feedback associated with the feedback signal.

72. The method of claim 71, wherein a magnitude of the haptic feedback is increased in response to increases in the detected degree of force or pressure.

73. The method of claim 71, wherein outputting haptic feedback includes simulating friction.

74. The method of claim 71, wherein outputting haptic feedback includes outputting haptic feedback based on a velocity of the object in the x-y plane.

75. The method of claim 71, wherein outputting haptic feedback is based on detecting a predetermined level of force.

76. The method of claim 71, further comprising controlling an indexing function of a user interface device based on the detected degree of force.

77. The device of claim 47, wherein the linkage includes a pointer member configured to contact the touchpad sensor.

78. The device of claim 47, wherein the linkage is further coupled to the actuator.

79. The device of claim 60, wherein the linkage includes a pointer member configured to contact the touchpad sensor.

80. The device of claim 60, wherein the linkage is further coupled to the actuator.